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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,498	12/31/2003	Cory E. Weber	42P15310D	2797

7590 01/25/2006

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EXAMINER	
INGHAM, JOHN C	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 01/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/750,498	WEBER ET AL.	
	Examiner	Art Unit	
	John C. Ingham	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6/04/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: paragraph 32 on page 17 refers to "the source/drain extensions 529", which are previously identified as item 526.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims **12-23 and 25** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu (US 6,180,468) in view of Maegawa (US 2005/0167673).

Regarding claim **12**, Yu discloses an integrated circuit (MOS transistor in abstract) comprising: an indium retrograde well (Fig 5, profile 46) inside a substrate (12), the indium retrograde well including an indium concentration greater than about $3E18/cm^3$ (col 3 ln 57-61). Yu does not disclose wherein the retrograde well includes fluorine.

Maegawa teaches the use of fluorine for suppressing diffusion of boron, a known equivalent of indium (¶ 218). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Maegawa on the structure disclosed by Yu in order to suppress diffusion of indium.

Regarding claim **13**, Yu in view of Maegawa disclose the integrated circuit of claim 12, wherein the indium-fluorine retrograde well includes an indium concentration three times, or more, greater than $3E18/cm^3$ (concentration is 1E19, col 3 ln 57-61).

Regarding claims **14,** Yu in view of Maegawa makes obvious the integrated circuit of claim 12, wherein the indium-fluorine retrograde well includes a fluorine concentration between about $5E18/cm^3$ to about $3E20/cm^3$. Regarding claim **15**, Yu in view of Maegawa makes obvious the integrated circuit of claim 12, wherein the indium-fluorine retrograde well includes an indium concentration peak at about 200Å, or deeper, below the substrate surface. Since applicant has not established the criticality of the thicknesses and concentrations stated and since these thicknesses and concentrations are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these values in the device of Yu. Where patentability is said to be based upon particular chosen dimensions or upon another

variable recited in a claim, the applicant must show that the chosen dimensions are critical. *In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).*

With regards to claim **16**, Yu in view of Maegawa disclose an integrated circuit comprising: a substrate (Yu Fig 6 item 12); a gate structure (50) formed on the substrate; and an indium-fluorine retrograde well (Yu figure 5 item 46, fluorine taught by Maegawa as applied to claim 12) formed to a shallow depth below a surface of the substrate and beneath the gate structure.

Regarding claim **17,** Yu in view of Maegawa disclose the integrated circuit of claim 16, comprising an indium concentration above about $3E18/cm^3$ (Yu col 3 ln 57-61).

Regarding claim **18**, Yu in view of Maegawa disclose the integrated circuit of claim 16, wherein the indium-fluorine retrograde well includes an indium concentration three times, or more, greater than $3E18/cm^3$ (concentration is 1E19, col 3 ln 57-61).

Regarding claims **19,** Yu in view of Maegawa makes obvious the integrated circuit of claim 16, wherein the indium-fluorine retrograde well includes a fluorine concentration between about $5E18/cm^3$ to about $3E20/cm^3$. Regarding claim **20**, Yu in view of Maegawa makes obvious the integrated circuit of claim 16, wherein the indium-fluorine retrograde well includes an indium concentration peak at about 200Å, or deeper, below the substrate surface. Since applicant has not established the criticality of the thicknesses and concentrations stated and since these thicknesses and concentrations are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these values in the device of Yu. Where

patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. *In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).*

With regards to claim **21**, Yu in view of Maegawa disclose an integrated circuit comprising: a gate structure (Yu Fig 6 item 50) overlying a silicon substrate (12); source/drain regions (14, 16) inside the silicon substrate, the source/drain regions adjacent to opposing sides of the gate structure and extending slightly underneath the gate structure (extensions 18, 20); and a fluorine-indium retrograde well (Fig 5 item 46, fluorine taught by Maegawa) directly beneath the gate structure and between the source/drain regions, the fluorine-indium retrograde well including an indium concentration greater than 3E18/cm^3 (Yu col 3 ln 57-61).

Regarding claim **22**, Yu in view of Maegawa disclose the integrated circuit of claim 21. Since the indium concentration in the indium-fluorine retrograde well is well over 1E19, the device can provide a threshold voltage greater than about 360mV.

Regarding claim **23**, Yu in view of Maegawa makes obvious the integrated circuit of claim 21, wherein the indium-fluorine retrograde well includes an indium concentration peak at about 200Å, or deeper, below the substrate surface. Since applicant has not established the criticality of the thicknesses and concentrations stated and since these thicknesses and concentrations are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these values in the device of Yu. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the

chosen dimensions are critical. *In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).*

Regarding claim **25**, Yu in view of Maegawa disclose the integrated circuit of claim 21, wherein the indium-fluorine retrograde well includes an indium concentration three times, or more, greater than 3E18/cm^3 (concentration is 1E19, col 3 ln 57-61).

5. Claim **24** is rejected under 35 U.S.C. 103(a) as being unpatentable over Yu in view of Maegawa as applied to claim 21 above, and further in view of Weber (US 2004/0061187).

Yu in view of Maegawa disclose the integrated circuit of claim 21, but do not specify that the gate structure have a length of about 60nm or less.

Weber teaches a transistor gate length of 60nm or less (page 2 ln 1), useful because in general, the threshold voltage tends to decrease in response to reduced gate length (¶ 7). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Weber on the device as disclosed by Yu and Maegawa.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nayak (US 6,194,259) teaches the use of indium over boron, and states that nitrogen inhibits diffusion.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John C. Ingham whose telephone number is (571) 272-8793. The examiner can normally be reached on M-F, 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

John C Ingham
Examiner
Art Unit 2814

jci